

CLAIMS

What is claimed is:

1. A method for forming a thermoplastic film having a closure strip, the method comprising the steps of:

- (a) providing a thermoplastic film web having a sealing surface, the temperature of the film web being below a melting temperature of the film web;
- (b) providing a thermoplastic closure strip having a binding surface, the temperature of the closure strip being below a melting temperature of the closure strip;
- (c) extruding a thermoplastic binder layer;
- (d) positioning the film web and the closure strip such that the film web and the closure strip are not in overlapping relationship;
- (e) positioning the binder layer on the sealing surface of the film web and on the binding surface of the closure strip such that the binder layer contacts the sealing surface of the film web before the binder layer has cooled to a temperature below the melting temperature of the film web and the binder layer contacts the binding surface of the closure strip before the binder layer has cooled to a temperature below the melting temperature of the closure strip; and
- (f) thereafter applying pressure to the binder layer so as to bind the closure strip and film web to the binder layer.

2. The method of claim 1, wherein:
step (f) comprises thereafter applying pressure to the closure strip, the film web and the binder layer so as to bind the closure strip and film web to the binder layer.

3. The method of claim 1, wherein:
step (b) comprises providing a thermoplastic female closure strip having a first binding surface and providing a thermoplastic male closure strip having a second binding surface, the temperature of both closure strips being below their respective melting temperatures;
step (c) comprises extruding a first thermoplastic binder layer and extruding a second thermoplastic binder layer; and

step (e) comprises positioning the first binder layer on a first sealing surface of the film web and the first binding surface of the female closure strip such that the first binder layer contacts the first sealing surface of the film web before the first binder layer has cooled to a temperature below the melting temperature of the film web and the first binder layer contacts the first binding surface of the female closure strip before the first binder layer has cooled to a temperature below the melting temperature of the female closure strip, and positioning the second binder layer on a second sealing surface of the film web and the second binding surface of the male closure strip such that the second binder layer contacts the second sealing surface of the film web before the second binder layer has cooled to a temperature below the melting temperature of the film web and the second binder layer contacts the second binding surface of the male closure strip before the second binder layer has cooled to a temperature below the melting temperature of the male closure strip; and

step (f) comprises thereafter applying pressure to the first binder layer and the second binder layer so as to bind the film web and the female closure strip to the first binder layer and bind the film web and the male closure strip to the second binder layer.

4. The method of claim 1, wherein the film has a thickness of between 0.025 millimeters and 0.254 millimeters.

5. The method of claim 1, wherein the binder layer has a thickness of between 0.025 millimeters and 0.152 millimeters.

6. A method for forming a thermoplastic film having a closure strip, the method comprising the steps of:

5 (a) providing a first cylindrical roller having a surface and an axis of rotation and a second cylindrical roller having a surface and an axis of rotation, the axis of the first roller and the axis of the second roller being substantially coplanar, the first roller and the second roller being aligned in spaced apart relationship such that a pinch area is formed between the surface of the first roller and the surface of the second roller;

10 (b) feeding a continuous length of a thermoplastic film web having a sealing surface such that the film web wraps on the surface of the first roller while the temperature of the film web is below a melting temperature of the film web;

15 (c) feeding a continuous length of a thermoplastic closure strip having a binding surface such that the closure strip wraps on the surface of the second roller while the temperature of the closure strip is below a melting temperature of the closure strip;

(d) extruding a thermoplastic binder layer;

(e) positioning the binder layer on the sealing surface of the film web and on the binding surface of the closure strip; and

20 (f) feeding the film web, the binder layer and the closure strip through the pinch area such that the film web and the closure strip are not in overlapping relationship and such that the binder layer contacts the sealing surface of the film web before the binder layer has cooled to a temperature below the melting temperature of the film web and the binder layer contacts the binding surface of the closure strip before the binder layer has cooled to a temperature below the melting temperature of the closure strip.

7. The method of claim 6, wherein:

30 step (e) comprises applying the binder layer to the binding surface of the closure strip before the closure strip reaches the pinch area; and

step (f) comprises feeding the film web and the closure strip through the pinch area to create pressure on the film web and the closure strip such that the binder layer contacts the sealing surface of the film web before the binder layer

has cooled to a temperature below the melting temperature of the film web and the binder layer contacts the binding surface of the closure strip before the binder layer has cooled to a temperature below the melting temperature of the closure strip.

8. An apparatus for forming a thermoplastic film having a closure strip, the apparatus comprising:

a cylindrical lamination roller having a surface and an axis of rotation;

a cylindrical lay-on roller having a surface and an axis of rotation, the axis of the lamination roller and the axis of the lay-on roller being substantially coplanar, the lamination roller and the lay-on roller being aligned in spaced apart relationship such that a pinch area is formed between the surface of the lamination roller and the surface of the lay-on roller;

a web feed roller for feeding a continuous length of a thermoplastic film web having a sealing surface, the web feed roller being positioned such that the film web can wrap on the surface of the lamination roller after leaving the web feed roller;

a closure strip feed roller for feeding a continuous length of a thermoplastic closure strip having a binding surface, the closure strip feed roller being positioned such that a closure strip can wrap on the surface of the lay-on roller after leaving the closure strip feed roller; and

an extruder for extruding a heated thermoplastic binder layer, the extruder including a die block with an opening, and the extruder being positioned such that the opening in the die block is adjacent the pinch area so as to be suitable to direct a heated binder layer on a nonheated closure strip and a nonheated film web,

wherein the web feed roller and the closure strip feed roller are positioned such that the film web and the closure strip are aligned in non-overlapping relationship.

9. An apparatus for forming a thermoplastic film having a closure strip, the apparatus comprising:

a cylindrical lamination roller having a surface and an axis of rotation;

a cylindrical lay-on roller having a surface and an axis of rotation, the axis of the lamination roller and the axis of the lay-on roller being substantially coplanar, the lamination roller and the lay-on roller being aligned in spaced apart relationship such that a pinch area is formed between the surface of the lamination roller and the surface of the lay-on roller;

a web feed roller for feeding a continuous length of a thermoplastic film web having a sealing surface, the web feed roller being positioned such that the film web can wrap on the surface of the lamination roller after leaving the web feed roller;

a closure strip feed roller for feeding a continuous length of a thermoplastic closure strip having a binding surface, the closure strip feed roller being positioned such that the closure strip can wrap on the surface of the lamination roller after leaving the closure strip feed roller; and

an extruder for extruding a heated thermoplastic binder layer, the extruder including a die block with an opening, and the extruder being positioned such that the opening in the die block is adjacent the pinch area so as to be suitable to direct a heated binder layer on a nonheated closure strip and on a nonheated film web.

10. The apparatus of claim 9, wherein:

the web feed roller and the closure strip feed roller are positioned such that the film web and the closure strip wrap on the surface of the lamination roller in non-overlapping relationship.

11. A reclosable thermoplastic bag comprising:

a first panel and a second opposed panel, the first panel and the second panel being formed from a thermoplastic film, the first panel and the second panel being connected along a pair of sides and a bottom bridging the pair of sides such that an opening is formed between the pair of sides;

a reclosable zipper extending along the opening, the zipper including (i) a thermoplastic female closure strip having a female closure profile on an inner surface of the female closure strip and a flange portion below the female closure profile, the flange portion of the female closure strip having a first binding surface, and (ii) a thermoplastic male closure strip having a male closure profile on an inner surface of the male closure strip and a flange portion below the male closure profile, the flange portion of the male closure strip having a second binding surface, the female closure profile and the male closure profile being configured to interlock with one another;

a first thermoplastic binder layer bonded to the flange portion of the female closure strip and bonded adjacent the opening to a first sealing surface of the first panel; and

a second thermoplastic binder layer bonded to the flange portion of the male closure strip and bonded adjacent the opening to a second sealing surface of the second panel,

wherein the first panel and the female closure strip are not in overlapping relationship.

12. The bag of claim 11, wherein the second panel and the male closure strip are not in overlapping relationship.

13. The bag of claim 11, wherein the film has a thickness of between 0.025 millimeters and 0.254 millimeters.

14. The bag of claim 11, wherein the first binder layer and the second binder layer have a thickness of between 0.025 millimeters and 0.152 millimeters.

15. The bag of claim 11, wherein the flange portion of the female closure strip and the flange portion of the male closure strip have a thickness of between 0.076 millimeters and 0.305 millimeters.

16. The bag of claim 11, wherein the first thermoplastic binder layer is bonded to the inner surface of the female closure strip and is bonded to an exterior surface of the first panel, and the second thermoplastic binder layer is bonded to the inner surface of the male closure strip and is bonded to an exterior surface of the second panel.

17. The bag of claim 11, wherein the first thermoplastic binder layer is bonded to the inner surface of the female closure strip and is bonded to an interior surface of the first panel, and the second thermoplastic binder layer is bonded to the inner surface of the male closure strip and is bonded to an interior surface of the second panel.

18. The bag of claim 11, wherein the first thermoplastic binder layer is bonded to an outer surface of the female closure strip and is bonded to an interior surface of the first panel, and the second thermoplastic binder layer is bonded to an exterior surface of the male closure strip and is bonded to an interior surface of the second panel.

19. The bag of claim 11, wherein the first thermoplastic binder layer is bonded to an outer surface of the female closure strip and is bonded to an exterior surface of the first panel, and the second thermoplastic binder layer is bonded to an outer surface of the male closure strip and is bonded to an exterior surface of the second panel.

20. The bag of claim 11, wherein the film comprises low or high density polyethylene, linear low density polyethylene, polypropylene, nylon, interpolymers of ethylene and one or more monomers copolymerizable therewith, and mixtures thereof.

21. The bag of claim 11, wherein the female closure strip and the male closure strip comprise low or high density polyethylene, linear low density polyethylene, polypropylene, nylon, interpolymers of ethylene and one or more monomers copolymerizable therewith, and mixtures thereof.

22. The bag of claim 11, wherein the first binder layer and the second binder layer comprise low or high density polyethylene, linear low density polyethylene, polypropylene, nylon, interpolymers of ethylene and one or more monomers copolymerizable therewith, and mixtures thereof.

23. The bag of claim 11, wherein an end of the female closure strip and an end of the first panel are in abutting relationship.

24. The bag of claim 11, wherein an end of the male closure strip and an end of the second panel are in abutting relationship.

25. The bag of claim 11, further comprising a slider slidably mounted to the zipper for movement between a closed position and an open position, the slider being adjacent to one of the pair of sides while in the closed position and being adjacent to the other of the pair of sides while in the open position, the female closure profile and the male closure profile being engaged to each other in response to movement of the slider in a closing direction from the open position to the closed position, and the female closure profile and the male closure profile being disengaged from each other in response to movement of the slider in an opening direction from the closed position to the open position.